



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Telecommunications and**  
**Information Administration**  
Washington, D.C. 20230

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February 18, 1999

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

Ms. Magalie Roman Salas  
Secretary  
Federal Communications Commission  
The Portals  
445 Twelfth Street, S.W.  
Washington, D.C. 20554

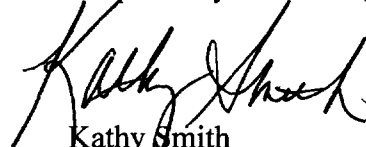
Re: The Development of Operational, Technical and Spectrum Requirements for  
Meeting Federal, State and Local Public Safety Agency Communication  
Requirements Through Year 2010 - Establishment of Rules and Requirements for  
Priority Access Service, WT Docket No. 96-86

Dear Ms. Salas:

Enclosed please find an original and four copies of the Reply Comments of the National Telecommunications and Information Administration to the Commission's Third Notice of Proposed Rulemaking in the above-referenced proceeding. A copy on diskette has also been submitted to the Policy and Rules Branch, Public Safety and Private Wireless Division, Wireless Telecommunications Bureau and to the International Transcription Service, Inc.

Please direct any questions you may have regarding this filing to the undersigned. Thank you for your cooperation.

Respectfully submitted,

  
Kathy Smith  
Acting Chief Counsel

Enclosures

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Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, DC 20554

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In the Matter of	)	
	)	
The Development of Operational,	)	
Technical and Spectrum Requirements	)	
For Meeting Federal, State and Local	)	WT Docket No. 96-86
Public Safety Agency Communication	)	
Requirements Through the Year 2010	)	
	)	
Establishment of Rules and Requirements	)	
For Priority Access Service	)	

**REPLY COMMENTS OF THE NATIONAL TELECOMMUNICATIONS  
AND INFORMATION ADMINISTRATION**

The National Telecommunications and Information Administration (NTIA) respectfully submits the following Reply Comments in response to the Commission's Third Notice of Proposed Rulemaking in the above-captioned proceeding.<sup>1</sup> Specifically, NTIA addresses comments concerning the Regional Planning Committees (RPCs), the 138-144 MHz band, and protection of the Global Navigation Satellite System (GNSS).

**I. To Achieve Efficient and Effective Spectrum Management, Regional Planning Committees Should Include Federal Members.**

In the Third Notice, the Commission sought comments on ways to refine or modify the Regional Planning Committee (RPC) to ensure a more efficient and effective method of

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<sup>1</sup> *The Development of Operational, Technical and Spectrum Requirements For Meeting Federal, State and Local Public Safety Agency Communication Requirements Through the Year 2010 and Establishment of Rules and Requirements For Priority Access Service*, WT Docket No. 96-86, FCC 98-191 (rel. Sept. 29, 1998) (hereinafter "Third Notice").

spectrum management.<sup>2</sup> In its comments, NTIA proposed that each RPC have at least one Federal member with voting status.<sup>3</sup> The Federal Law Enforcement Wireless Users Group (FLEWUG) strongly supports this position. In its comments, the FLEWUG urged the Commission to provide that at least one representative from the Federal Government be included on each 700 MHz RPC.<sup>4</sup>

We disagree with the views expressed by some commenters who suggest that the RPCs should be composed solely of members currently employed by local governments in each respective region.<sup>5</sup> This position fails to recognize that efficient and effective spectrum management at the regional level requires that all levels of government using spectrum for public safety purposes - local, State, and Federal - be involved in the planning process.

## **II. The Commission Does Not Have the Authority to Reallocate the 138-144 MHz Band.**

In the Third Notice, the Commission sought comment on establishing an interoperability band in the 138-144 MHz band.<sup>6</sup> NTIA believes that the Commission lacks the authority to reallocate the 138-144 MHz band to Public Safety Services for a number of reasons set forth in our comments.<sup>7</sup> We note that the Office of Management and Budget (OMB) and the FLEWUG

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<sup>2</sup> Third Notice at ¶ 173.

<sup>3</sup> Comments of NTIA (NTIA Comments), WT Dkt. No. 96-86, at 16 (Jan. 19, 1999).

<sup>4</sup> Comments of the FLEWUG (FLEWUG Comments), WT Dkt. No. 96-86, at 14 (Jan. 19, 1999).

<sup>5</sup> See e.g., Joint Comments of the National League of Cities and the City and County of San Francisco, WT Dkt. No. 96-86, at 12 (Jan. 19, 1999).

<sup>6</sup> Third Notice at ¶ 193.

<sup>7</sup> NTIA Comments at 13.

support NTIA's views on this issue.<sup>8</sup>

### **III. The Evolution of Global Navigation Satellite Systems Requires Protection of Radionavigation Satellite Service Spectrum.**

Several commenters have questioned the need for the protection limits proposed by the Commission to protect the United States Global Positioning System (GPS) and the Russian Federation Global Navigation Satellite System (GLONASS) Radionavigation Satellite Service (RNSS) receivers operating in the 1559-1610 MHz band.<sup>9</sup> These commenters fail to recognize that use of the 1559-1610 MHz band is evolving and that other Global Navigation Satellite Systems (GNSS) are under development for operation in the band. In addition to GPS, GLONASS, and their augmentation systems, there are other RNSS systems proposed for operation in the 1559-1610 MHz band.<sup>10</sup>

For example, the French Administration and the European Space Agency (ESA) have advanced-published RNSS systems with the International Telecommunication Union-Radiocommunications Sector (ITU-R) that will operate in the 1559-1610 MHz band. The French

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<sup>8</sup> Letter from Michael Deich, Associate Director for General Government and Finance, Office of Management and Budget, to Chairman William E. Kennard, WT Dkt. No. 96-86 (Jan. 4, 1999); FLEWUG Comments at 19-20.

<sup>9</sup> See e.g., Comments of Motorola (Motorola Comments), WT Dkt. No. 96-86, at 2 (Jan. 19, 1999); Comments of the New York State Technology Enterprise Corporation (NYSTEC Comments), WT Dkt. No. 96-86, at 15 (Jan. 19, 1999); Comments of the State of Arizona (Arizona Comments), WT Dkt. No. 96-86, at 5 (Jan. 19, 1999); Comments of the Association of Public-Safety Communications Officials-International, Inc. (APCO Comments), WT Dkt. No. 96-86, at 9 (Jan. 19, 1999); Comments of the National Public Safety Telecommunications Council (NPSTC Comments), WT Dkt. No. 96-86, at 12 (Jan. 19, 1999).

<sup>10</sup> Space Based Augmentation Systems (SBAS) and Ground Based Augmentation Systems (GBAS) for GPS operate in the 1559-1610 MHz band. The SBAS and GBAS will also support the data format used by GLONASS.

Low SATellite NAVigation (LSATNAV) and the ESA E-NSS-1 satellite navigation systems have been proposed for operation in the 1559.052-1563.144 MHz and 1587.696-1591.788 MHz portions of the 1559-1610 MHz band. It is envisioned that one of these RNSS systems will be included in the second generation of GNSS referred to as GNSS-2. The United States is also currently engaged in discussions with the European Union (EU) regarding the implementation of GNSS-2 and the development of RNSS systems that are compatible and interoperable with GPS. At this time, it is unknown what portion of the 1559-1610 MHz band the EU is considering for their potential future RNSS system.<sup>11</sup>

All of the RNSS systems operating or proposed for operation in the 1559-1610 MHz band are characterized by an extremely low signal level at the surface of the Earth (*e.g.*,  $1 \times 10^{-16}$  Watts), making them susceptible to interference. This susceptibility to interference has raised concerns regarding the robustness of GPS for use in civil aviation. To address these concerns, the Federal Aviation Administration (FAA), with co-sponsorship from the Air Transport Association (ATA) and the Aircraft Owners and Pilots Association (AOPA), requested that the Johns Hopkins University Applied Physics Laboratory (JHU/APL) perform an independent GPS risk assessment study.<sup>12</sup> The JHU/APL Study specifically recommended that regulations for all licensed transmitters be developed with explicit radio frequency emissions limits at satellite-navigation frequencies.<sup>13</sup>

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<sup>11</sup> See "Brussels Seeks European Support For Satellite Navigation System," *Telecommunications Reports*, at 24 (Feb. 15, 1999).

<sup>12</sup> Johns Hopkins University Applied Physics Laboratory, *GPS Risk Assessment Study Final Report* (JHU/APL Study), VS-99-007 (Jan. 1999).

<sup>13</sup> *Id.* at ES-6.

Several commenters have also questioned the viability of GLONASS for a reliable global navigation system based on the current fiscal instability and political status of the Russian Federation.<sup>14</sup> NTIA disagrees with their assessment. As noted by the GPS Commenters, the Russian Federation successfully added three more satellites to their constellation in December of 1998.<sup>15</sup> There have also been recent discussions between the Russian Federation and European representatives regarding GLONASS. It has been reported that one area of discussion is the co-ownership of GLONASS and the spectrum in which it currently operates (1598-1605 MHz).<sup>16</sup> It is premature to speculate on the outcome of these discussions, but it is another example of the continuing evolution of the 1559-1610 MHz band.

The GPS Commenters also address the issue of current levels of interference in the 1559-1610 MHz band. They correctly note that “[i]f anything, the existence of interference from other sources heightens the need for the Commission to be vigilant in ensuring no additional interference is introduced into the GPS band.”<sup>17</sup> Based on the continuing evolution of the 1559-1610 MHz band, it is important to adopt limits that minimize additional interference to GNSS receivers. Therefore, NTIA reiterates its support for the levels proposed by the Commission in the new section 90.553 and recommends that they be applied to all spurious emissions, including

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<sup>14</sup> NPSTC Comments at 13; Arizona Comments at 5; NYSTEC Comments at 17.

<sup>15</sup> Joint Comments of the U.S. GPS Industry Council, Air Travelers Association, American Airlines, General Aviation Manufacturers Association, Outreach, Stanford University (GPS Research Program), and United Airlines (GPS Commenters Comments), WT Dkt. No. 96-86, at 4 (Jan. 19, 1999).

<sup>16</sup> *See supra* note 11; *see also* “Continental Shift: Changing Strategies in GNSS Chess Match,” *GPS World Magazine*, at 14 (Jan. 1999).

<sup>17</sup> GPS Commenters Comments at 15.

second harmonics in the 1559-1605 MHz frequency range.

#### **IV. Interference Suppression Techniques are not a Substitute for GNSS Receiver Protection Limits.**

Motorola's comments suggest that interference suppression technology could be employed to reduce the protection limits for GNSS receivers.<sup>18</sup> Motorola includes an example of one type of interference suppression technology for GPS in the appendix to their comments. NTIA disagrees with the premise that interference suppression technology can serve as an appropriate substitute for GNSS receiver protection limits. Performance limitations and prohibitive costs limit the viability of this technology for many GPS applications.

To build cost effective avionics, GPS receiver manufacturers have designed and hardened their receivers based upon traditional radio frequency interference (RFI) mitigation strategies. For the near future, the civil aviation and GPS receiver manufacturing industries have rejected employing certain newer, higher-risk techniques such as adaptive antennas, adaptive filters (noise cancelers), accelerometers, and vector processing, as not economically viable for civil aviation. These techniques have not been shown to have acceptable integrity and safety assurance impacts for civil aviation purposes.<sup>19</sup>

RTCA has specifically reviewed two interference mitigation techniques: vector tracking loop and adaptive null-steering antennas. RTCA determined that the technique of vector tracking

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<sup>18</sup> Motorola Comments at 6.

<sup>19</sup> RTCA Inc. Special Committee No. 159, *Assessment of Radio Frequency Interference Relevant to the GNSS*, Document No. RTCA/DO-235 (RTCA/DO-235), at F-25 (Jan. 27, 1997). RTCA, formerly known as the Radio Technical Commission for Aeronautics, is a voluntary government/industry group which performs studies and makes recommendations pertaining to radio use for aviation.

loop was an unproven technology that would require a processor with extremely high throughput, which would result in high cost and higher power consumption. It was also determined that adaptive null-steering antennas have a high associated cost and there will be problems with size, aerodynamic drag, lightning, reliability, and signal phase shift.<sup>20</sup>

The JHU/APL Study also examined whether GPS interference suppression technologies could mitigate interference.<sup>21</sup> The JHU/APL Study reviewed five different technologies: inertial measurement unit (IMU) receiver code loop aiding; adaptive controlled radiation pattern antennas (CRPA); low elevation antenna nuller (LEAN); signal polarization cancellation antennas; and reference cancelers. As indicated in the JHU/APL Study, these mitigation techniques have been developed by manufacturers primarily for military applications. The JHU/APL Study shows that there is an associated implementation cost for these suppression techniques that range from \$2,000 to \$40,000.<sup>22</sup> The JHU/APL Study also points out that there are limitations to these interference suppression techniques. For example, a nulling antenna will typically degrade as the number of interference sources increase. It can also degrade as a function of the geometric relationship between the antenna and the interferer locations. Using this interference technique, there is also the possibility that the antenna not only nulls interference, but might also null the desired GPS signal.<sup>23</sup>

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<sup>20</sup> *Id.* at F-22.

<sup>21</sup> JHU/APL Study at 5-10.

<sup>22</sup> *Id.* at 5-11.

<sup>23</sup> *Id.* By virtue of the adaptive nulling algorithm, a null might be placed in a direction other than the direction of the interference source. The desired signal may also be nulled in directions close to an interferer.



NTIA acknowledges that interference suppression techniques, primarily developed for military applications, do exist for GPS. There are also some GNSS applications that could take advantage of such techniques. However, there are many GNSS applications, including civil aviation, where these interference suppression techniques are currently not appropriate from an implementation and performance point of view. There is also a problem with the prohibitive cost associated with the implementation of these interference suppression techniques. Based on these factors, NTIA does not believe that interference suppression techniques should be used as a substitute for GNSS receiver protection limits.

**V. Out-of-Band Emissions Pose Interference Threats to GNSS Receivers.**

Motorola suggests that out-of-band emissions that are not harmonically related to the fundamental carrier of 700 MHz public safety transmitters pose no interference threat to GNSS receivers.<sup>24</sup> Motorola maintains Section 8.2 of RTCA/DO-235 supports this premise.

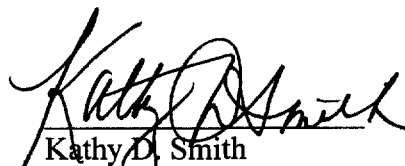
NTIA disagrees with Motorola's premise and its reading of Section 8.2 of RTCA/DO-235. While Section 8.2 does primarily address harmonically related interference to GNSS receivers, it also describes concerns with other unwanted emissions interfering with GNSS receivers. RTCA specifically recommends that an investigation be undertaken to evaluate the unwanted emission levels in the 1559-1610 MHz band from currently-operational very high frequency (VHF) equipment. RTCA is concerned that the equipment used in the VHF band could have unwanted emissions that can cause an interference environment exceeding that specified in the GPS/Wide Area Augmentation System (WAAS) Minimum Operational Performance Standards (MOPS) necessary for Category I precision approach landings. RTCA

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<sup>24</sup> Motorola Comments at 4.

further recommends that, based on the results of this investigation, it may be necessary for the Commission and the FAA to develop an implementation schedule for imposition of unwanted emission levels consistent with those specified in the GPS/WAAS MOPS.<sup>25</sup> It is clear that RTCA is not only concerned with harmonically related interference, but with unwanted emissions in the 1559-1610 MHz band, which would include spurious emissions from the ubiquitous utilization of VHF transceivers.

Respectfully submitted,



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<sup>25</sup> RTCA/DO-235 at 30.